Ontario

Development of a Flexible Laser-Robotic Manufacturing System

"Lasers are increasingly used in modern industrial manufacturing. The advantages of using lasers for metal cutting, welding and heat treatment include low energy stress, little distortion of the work piece, high production speed, flexibility and easy automation. The laser is a very effective processing tool to meet the demands of just-in-time manufacturing."

Walter Duley
President
Powerlasers Ltd.
Waterloo, Ontario

THE COMPANY

Powerlasers was established in 1976 as an industrial laser research facility. In 1993, the company was the first in North America to announce the capability to reliably laser weld various aluminum alloys. This has enabled Powerlasers to become a leader in laser applications for the automotive industry.

THE CHALLENGE

A typical car consists of 20,000 parts, many of which must be cut, welded and/or heat treated. This requires sequential processing, which compromises the just-in-time demands of the manufacturer.

Laser cutting, welding and heat treating are inherently different processes. Each used to require highly specialized equipment and set-up, calling for a large investment by the manufacturer. The challenge has been to design and develop a single piece of equipment that can be switched easily and quickly from one process to the other.

THE SOLUTION

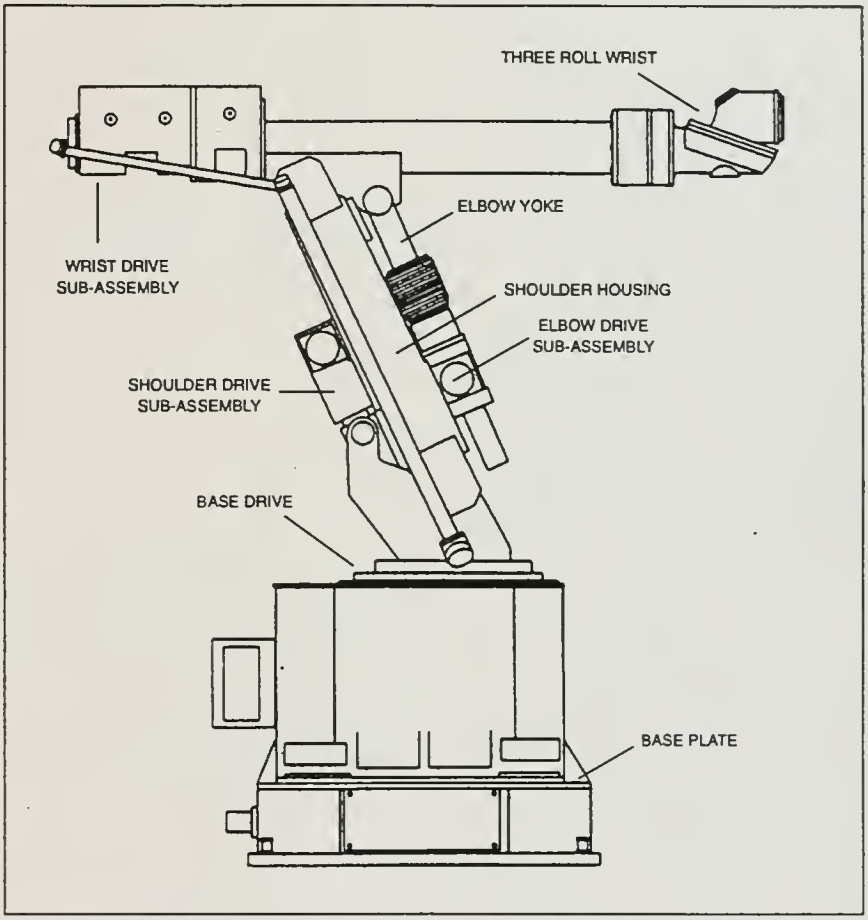
Powerlasers has developed a laser/robotic system that can be rapidly switched between cutting, welding and heat treating applications.

For low-power systems, beams from two independently adjustable carbon dioxide lasers are mixed and applied to the work piece by a robot. This Optomux system allows laser cutting with lower laser powers and increases the overall energy efficiency of the process.

For high-power applications, a flexible approach incorporating an automated welding head has been developed. This enables the laser to be switched between cutting, welding and heat treating with minimal downtime.

The new single laser system improves the efficiency of manufacturing car parts and provides:

* environmental benefits and energy conservation;
* increased product quality through laser trimming;
* increased cutting accuracy measured in microns;
* reduced industrial scrap by eliminating warping and erosion of the edges of work pieces.



LT² Laser Robot

OPPORTUNITIES

The main advantages of this laser/robotic manufacturing system are its flexibility, speed, and capacity to operate, typically, for 90 per cent of the time, being down for set-up and maintenance only 10 per cent of the time. The flexible laser/robotic system can reduce costs, increase turn-

around speed, reduce scrap and increase product quality for the automotive and truck, plastics and tool and die industries.

About 90 per cent of the automotive cutting applications involve three-dimensional pre-formed parts, such as the inner hood, dashboard, entire sides of the car body and inner part of the doors. Laser welding of these auto components can improve production capacity by up to 40 per cent.

The main advantages of laser surface hardening of metals are the ability to localize the hardening effect, the elimination of component distortion, a high level of hardening and large energy savings.

Companies that require rotary cutting dies for metal, paper, fabric, plastics, rubber and clay products can also use the technology. About 400 such businesses in Ontario could benefit from the energy saving of 60 kilowatt hours per rotary cutting die. The heat treating industry alone could save about 830 TJ (terajoules or trillion joules) annually by using the new technology.

PARTNERSHIP IN POLLUTION PREVENTION AND RESOURCE CONSERVATION

Industrial companies located in Ontario may seek ministry/industry services that will help them to:

* reduce, reuse and recycle solid waste;
* reduce or eliminate liquid effluent and gaseous emissions;
* use energy and water more efficiently.

Equipment and services supply companies can benefit from the information provided on technologies identified for business development.

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MINISTRY OF ENVIRONMENT AND ENERGY SERVICES

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For more project profiles and other publications, visit the ministry's website at http://www.ene.gov.on.ca

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